

# **Los Alamos National Laboratory Transuranic Waste Inspectible Storage Project**

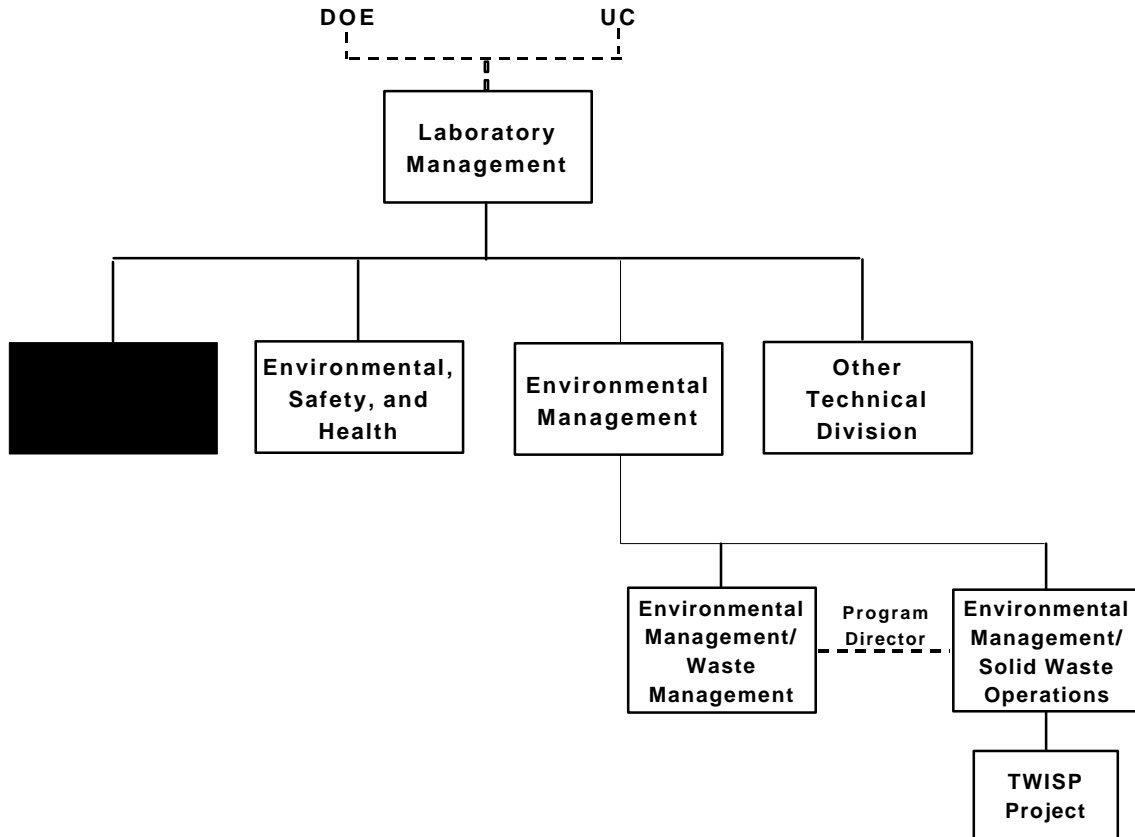
## **BUSINESS OVERVIEW**

The Transuranic (TRU) Waste Inspectible Storage Project (TWISP) is a \$50M activity (operations cost are approximately \$5M per year) at Los Alamos National Laboratory's (LANL) Environmental Management Division Solid Waste Operations Group (EM/SWO) in a site referred to as Material Disposal Area G. The purpose of the project is to retrieve and prepare for permanent disposal approximately 16,900 barrels and 188 fiberglass storage boxes containing a mix of radioactive and, in some cases, hazardous waste material generated in the 1979-1991 timeframe. Transuranic (elements heavier than uranium) waste stored at Area G is considered to be relatively high in radioactive content (above 100 nano-curies per gram) but not so "active" that it required remote handling. The project was begun in 1997 in response to an order by the State of New Mexico to initiate the preparation of waste for shipment and disposal at Waste Isolation Pilot Plant (WIPP).

The TWISP project is scheduled to be completed in December 2003 and currently employs 15 staff and contractors. The majority of staff is trades and craft laborers from Johnson Controls, International. The project is a part of a larger waste management program (WM) with an annual budget of approximately \$50M that is responsible for all waste-related activities at LANL. Approximately 500 people support the WM program in two major facilities: the Radioactive Liquid Waste Facility and the Solid Waste Operations facility

mentioned previously. Organizationally all of these groups and program reside in the Environmental Management Program (EM) within the Laboratory and support all technical divisions that generate waste as a part of on-going operations. Other programs in EM include Environmental Restoration, Science and Technology, and Environmental Stewardship – the primary organization responsible for facilitating pollution prevention and waste minimization at LANL. The Laboratory, with EM as its champion, sees achieving Green Zia Excellence status over the course of the next few years as an important indicator of our commitment to the environment, our employees, and the surrounding communities.

The University of California (UC) has managed Los Alamos National Laboratory for the Department of Energy (DOE) for over fifty years. Although UC is awarded a contract with DOE to perform TWISP as well as core Laboratory operations, it does not consider itself in competition with other potential managers of the facility. UC does not examine the operations at the LANL as a leverage point or stepping stone from which to pursue other markets or DOE facilities. Rather UC is committed to serving the United States Government with academic and scientific excellence through its management of the facility. Figure 1 –Organization identifies the organizational structure supporting TWISP.



The TWISP project includes the following activities:

- ◆ Drum & Box Retrieval – Dirt “overburden” is removed from the top and sides of fifty-five gallon drums and FRP crates buried beneath three large earthen berms that are stacked 3-5 high. An initial visual inspection is made and each item is retrieved using a forklift or crane. After removing the loose debris, a five-point swipe is taken and analyzed to determine if there is any external contamination and the drum is temporarily labeled. Upon retrieval, FRP crates are sent directly to inspectable storage. This activity occurs in an enclosed building.
- ◆ Drum Washing – Retrieved drums are washed and treated to remove rust inhibitor painted onto the drum when it was first placed in storage.
- ◆ Drum Venting and Re-labeling – The cleaned drum is placed in a custom machine, which installs a gas vent into the top of the drum. Hydrogen levels within the drum are measured during the venting process. A three-point swipe checking for contamination is then taken. Finally, a barcode label is placed on the drum, which is then forwarded to the TRU Storage Team.
- ◆ Drum Overpacking – This is the placement of a damaged or suspect drum into a larger container for storage. This activity can occur as a result of any of the inspection activities outlined in the prior three activities.

- ◆ Drum Location Tracking- This data base tracks the drums' location from retrieval to characterization and back to storage.

Once a drum has been processed it is forwarded to the TRU Storage Team in EM/SWO who manages waste requiring characterization and shipment to WIPP.

Each of the above activities has unique potential risks to worker health & safety as well as potential exposure to the environment. There are also several circumstances where additional waste (called secondary waste) can be generated in the project. An example is in the washing process where rags are used to clean anti-corrosion substances from the surface of the drums. Certainly the personal Protective Equipment (PPE) used by the workers could be disposed of as a waste. The success of the project in minimizing this waste is key to TWISP being completed efficiently.

Material Disposal Area G has been defined as a nonreactor Category II nuclear facility. Such designation requires the facility to implement stringent planning and controls on all operations. These requirements include the preparation of a Site Safety Analysis Report (SAR), and Performance Assessment (PA) and imposes a greater quality assurance and safety requirement than is not required elsewhere at the Laboratory. The SAR describes current activities and the PA projects future impacts of these activities on the environment.

As a regulated activity by the State it is essential that TWISP meet its milestones in a compliant manner. The consequence of not meeting these obligations is that operations and activities across the

Laboratory can be suspended. Such a suspension can idle hundreds of workers and delay other projects at LANL. There is also significant concern about the health and safety of workers at the site. A series of injuries three years ago forced the laboratory into a stand-down mode while every procedure was walked down and assured as having necessary safety systems in place. There is no tolerance for a repeat of such accidents by either DOE or UC senior management and the laboratory has invested itself in providing accountability systems and training to achieve zero injuries or illnesses on the job.

## **1. Leadership**

### **1.1 Leadership System**

The day-to-day Leadership System that supports Environmental Excellence (EE) at TWISP begins with the Director of the Laboratory who, in 1998, issued a vision for a Laboratory that included zero environmental incidents. Similar goals are also supported at the highest levels of DOE where ambitious targets are developed for waste minimization and "green" procurement, among others. A comprehensive, pro-active, ethics-based system continues to be developed that tiers down from these Leadership goals. TWISP was established and implemented within the context of the EM Leadership system whose Program Director declared in 1994 that his goal was the generation of zero waste by Laboratory operation. At his direction, EM has been working to establish both processes and behaviors to achieve the zero waste goals. The system begins with this vision which is articulated in a strategic plan for the organization (discussed in Section 2). In addition to articulating a vision and set of objectives for a "sustainable" laboratory, the EM strategic plan also identifies how

each individual in the program is expected to contribute to the vision. This plan has become a cornerstone for the operations within EM and is regularly referred at the quarterly All Hands meetings. The leadership system, like many others, heavily utilizes these and other meetings to review and strengthen our approach to Environmental Excellence. At the weekly managers' meeting each organizational unit discusses their activities and status relative to the vision of a sustainable Laboratory. The vision has been aided by a leadership system that emphasizes partnership between EM program and line managers each of which uses their authority to deliver results that also cut across programs. For example, TWISP is using a recently deployed EM Science and Technology project called Green is Clean that eliminates suspect waste through real-time characterization. This was installed for their use with funding from the EM Environmental Stewardship Office

There are several leadership systems present in the Laboratory that support TWISP. There is an Operations Working Group of the senior leadership, which meets twice monthly. This group establishes the policies and guidance for how operations are conducted. Both the Integrated Safety Management and Facility Management programs implemented laboratory-wide were derived from this group. EM has actively embraced the Management Walkarounds program established in 1997. By actively examining processes and engaging staff at their area of activity, two way communications are encouraged and staff have a direct channel to the highest levels of management to make suggestions that might improve the project.

At the project level, TWISP leadership system can be best characterized as "inclusive". In its Weekly Management meetings, the Project Leader also includes at least one line staff so that as many people as possible are aware of the management challenges facing the project.

TWISP Leadership Team is comprised of the following:

*Project Leader*  
*Construction Engineer*  
*Safety Engineer*  
*Radiation Control Technician*  
*DOE Facility Rep*  
*Quality Assurance Officer*  
*EM/SWO Facility Staff*  
*Operations Supervisor*  
*Facility Environmental Monitor*  
*Project Industrial Hygienist*

At TWISP a number of additional leadership systems are used to motivate staff and improve their performance. First, there is generous use of the Laboratory's employee awards program. When the Project Leader received this award with his closest assistant, the two used the monetary award to host a Bar-B-Que for the rest of the team. Not surprisingly, at that informal gathering, a worker made a drum washing process improvement suggestion which is one in a series of four improvements that is expected to save over six months in the project life cycle (potentially \$2.5M in savings) and yield significant reductions in secondary waste. Leadership by inclusion can also be seen as a key process improvement tool as described in Section 6.2.

In dealing with key suppliers, TWISP leadership has regular meetings to discuss the design and delivery of key

components of the system. This has resulted in a number of significant design improvements in the project, including an improved drum washing capability and re-engineering the forklift to streamline drum retrieval. These ongoing meetings will continue to be of significant value to other sites in the DOE complex through formal and informal lessons learned discussions.

Finally, the TWISP leadership system is supported by EM/SWO's commitment to continuous quality. In 1998 EM/SWO received the Pinion Award from the Quality New Mexico program. This award recognizes a commitment to quality and continuous improvement. EM/SWO demonstrates this commitment in the areas of worker health & safety and environmental impact as is seen in the results section of this document.

## **1.2 Community Leadership and Responsibility**

Community leadership is exhibited in a variety of ways within the TWISP project and includes organizational and individual activities. For instance, the EM Program has participated in activities such as sponsoring regional meetings on sustainability and water resources management. At the individual level, staff is guest lecturers in local schools and community groups. Within the TWISP project employees participate in educational programs such as the Science in Education program, working with the University of New Mexico Chemical Engineering program, and developing a long-term partnership with the University of Oklahoma. Staff also speaks at Kiwanas Club and other community group meetings. Staff has also volunteered in the development of the State of New Mexico's Green Zia

program and TWISP volunteered to be an early pilot for using the Green Zia Tools. The entire TWISP team was encouraged to attend the Green Zia Program kick-off at the State Capital as another indication to the community of our support for the program.

Since the community is viewed as a significant stakeholder, there is an extended discussion of how TWISP-specific results are communicated with these stakeholders in Section 3.3 - Stakeholder Focus.

## **2.0 Planning for Environmental Excellence**

### **2.1 Strategic Planning**

Strategic Planning is not conducted specifically within the TWISP. Rather, it is done at the WM program level as a part of the EM strategic plan. The EM strategic plan reflects both the institutional objectives of the Laboratory as well as the DOE customer's objectives. The most recent version of the EM strategic Plan entitled: Roadmap to Sustainability was published in 1998. This plan is scheduled for a major revision in the Spring/Summer 1999 to reflect the results of the LANL strategic planning process currently underway.

The following is the vision EM uses to set direction for all its operations: "In support of the Laboratory's mission, we are stewards of natural, operational, and human resources. We are partners in the regional economy and contribute scientifically to understanding and solving energy and environmental problems." Each organization in EM identified how it would contribute to achieving this vision both within their program and with other programs while

also delivering the results expected by DOE. In combination with the leadership systems previously described, this effort then set the stage for development and execution of the action plans described below.

## 2.2 Action plan development

Environmental Excellence is supported by the contract developed between DOE and UC that specifically identifies the scope of work and costs associated for each year. Commonly referred to as a programmatic baseline, this waste management plan provides a detailed description of *what* activities will be conducted and the resources planned for TWISP and other activities. The baseline assures DOE that resources are appropriately aligned to accomplish this scope. Through a formal change control process, as cost or process improvements in the activity are made, resources can be re-programmed to take advantage of the savings. Both time and financial resources are considered in this reprogramming effort.

As an activity being conducted in a non-reactor Category II Nuclear Facility, there are several other plans required of TWISP. The cornerstone of these plans is the SAR. The SAR describes *how* all the activities being done by the project and postulates accident scenarios that could impact the project and how those scenarios would be managed. The SAR is the basis for the New Mexico Environment Department (NMED) Remedial Action Plan, which is, attached to the compliance order that originally initiated the TWISP activity. When SAR is not followed, must report as a significant violation through 5003.b process and notify state. Use document review board to modify SAR and stay in

compliance. (Vertical drums were our violation with SAR) Several other plans are also produced from the SAR. These include:

- Fall Protection Plan
- Fire Protection Plan
- Joint Environment & Safety Plan
- Industrial and Radiation Monitoring Plan
- Project Management Plan
- Procurement Procedure
- Storm Water Pollution Prevention Plans
- Spill Prevention Plans
- Detailed Operating Plans

To assure an adequate safety envelope and compliance with laws and regulations The EM/SWO facility must also produce several operation plans. These include.

- Facility Management Plans
- Configuration Management Plans (CMP)
- Facility Safety Plans
- Quality Assurance Project Plans (QAPP)
- Emergency Action Plans
- Unanswered Safety Questions (USQ)
- Maintenance Implementation Plans
- Health and Safety Plan (HASP)
- Administrative Procedures (AP)
- Training Program Description & Job Analysis

Two of these plans are particularly noteworthy. First, the Health and Safety Plan is a customized description of potential hazards and their mitigation strategy specifically for TWISP. The Administrative Procedure is another key plan that translates laws and requirements into actionable language

that is used by workers in the conduct of operations. It is the single most important plan used in the day to day operation of TWISP.

All of the above plans include a formal change control process that manages the communications, distribution, and training requirements. The reader might consider the presence of so many different plans as unmanageable. However, they represent a process that is integral to assuring high quality work is conducted on very hazardous material often in difficult working conditions (such as respirators and bulky personal protective equipment) with minimal risk to the worker, his peers, surrounding communities, and the environment. At TWISP, and elsewhere at LANL, the plans are not developed and shelved. They are frequently referenced and must be understood by all affected parties to gain this assurance. In fact, as described in Section 6, the review and revision of these action plans are key activities in the ongoing work of TWISP.

### **2.3 Strategic and Action Plan Integration & Implementation**

Integration and implementation of plans occurs primarily in the Plan of the Day meetings held each morning prior to work commencing. These meetings outline the day's objectives together with equipment needs, safety or environmental concerns, and process improvement ideas regarding the project. The Plan of the Day meeting is a common practice at LANL, and has been remarkably effective on the TWISP project. This is most likely due to the inclusive approach to management discussed earlier. Plan of

the Day contains active dialog between all the team members assuring that safety concerns are addressed, ideas are considered, and results communicated. As with any high-performance team meeting it is a synergistic meeting that encourages both the good and the bad news and effectively leverages both. Action plans are also produced in the Weekly TWISP Management meeting.

Integration and implementation are significantly facilitated by the larger Project Management, All-Group, and All-Division meetings held frequently as well as by the extensive training program present at LANL. As described previously, portions of these meetings are devoted to safety discussions as well as communicating the ethic of zero environmental incidents and a vision of a sustainable Laboratory. Status reporting described in section 1.1 also cause integration of plans and provides evidence of their implementation. There are also incentives for integration developed by managers to encourage staff to work smarter and utilize additional resources to accomplish their work. An example of this is the Pollution Prevention Award given to staff who suggest approaches to reducing waste in their, or any other, organization.

Finally, training programs are a key component to assuring actions by workers that reflect integrated plans. Training on standardized practices such as hazardous material management or emergency operations is conducted on an LANL-wide basis. Site and task-specific training for TWISP is managed by EM/SWO.

### **3.0 Customer, Market and Stakeholder Focus**

### 3.1 Customer Focus –

The primary customer for TWISP is the Los Alamos Area Office of DOE (DOE/LAAO). With the exception of quarterly reviews conducted at DOE in Albuquerque, expectations of and support for TWISP are communicated by DOE/LAAO. The DOE customer has increased its expectations for all environmental programs at LANL to assure their competitiveness with the private sector. This expectation recently presented itself with a requirement that a make/buy analysis be conducted on the TWISP project to determine whether it made more sense for DOE to “compete” TWISP rather than retain UC to conduct the work. UC responded to the TWISP make/buy and continues to be responsive to DOE concerns regarding the project. To learn of such concerns as soon as possible TWISP management engages DOE in weekly meetings and through weekly status reports so they can hear issues close to the source. The EM/SWO World Wide Web site is also used to communicate with the customer. By using photographs and text as well as frequently updated statistics on its website, all DOE offices are well informed of the progress TWISP is making.

### 3.2 Market Focus –

Historically, the DOE Complex has been perceived as a captive market by LANL. This attitude has shifted recently where DOE might be a captive market, however the UC is not necessarily the only vendor that can provide waste services at LANL. As a result EM is much more conscious of improving the efficiency of our work, integrating with other vendors and demonstrating a sustainability ethic in our operations.

When considering the “market” in the context of the DOE Complex, TWISP addresses two areas. First, there are other sites that will be conducting similar operations. For instance, Idaho National Engineering and Environment Laboratory will be preparing over 30,000 TRU waste drums for final disposition. It is a key part of the EM mission to share lessons and best management practices with these other sites. This is accomplished by frequent interaction and tours (both LANL and their sites). Presentation at technical conferences (such as Waste Management 99) is another venue where TWISP communicates how it addresses environmental performance in the execution of workscope. As resource stewardship is an essential component to the EM mission, we encourage and tout our conservation efforts program-wide at such meetings. TWISP also works closely with the hardware vendors to continually improve their products. For example Nuclear Filter Technology modified their drum filter design (\$50 each) only had four holes. A fifth hole was added for sampling of headspace gas. Without this sampling hole, a new filter would have been required for each drum after its annual sampling.

The second approach to market focus is considering opportunities in the future for the team. It is unlikely that a “TWISP-R-US” spin-off can be developed from this project. As a result it is key to have professional development plans for team members. Expected to end in 2003, the TWISP team is now being positioned to undertake a similar project for EM/SWO in the area of large object decontamination and size reduction of TRU-contaminated glove-boxes. Retaining the team, as a cohesive, can-do group will provide assurances to



the DOE customer that future success likely will follow our present success. Also by identifying this opportunity now, the team can begin to identify relevant project lessons of today for application in the future.

### **3.3 Stakeholder Focus –**

The following are the key stakeholders of the TWISP Project: Employees and sub-contractors, nearby pueblos and other communities, NMED and US Environmental Protection Agency (EPA), UC, and the American taxpayer. These stakeholders are identified by a simple self-examination that asks the question: Who cares about the process and outcome of TWISP. TWISP works with these stakeholders through two primary mechanisms. The first is through the integration of TWISP activities with others, which are then reported or discussed with the affected stakeholder. The second is through direct contact with the stakeholder. This is done primarily in tours of the project. Roughly two tours a week of TWISP are conducted with outside parties. These tours range from official visits from DOE and LANL management to technical and other organizations such as the Association of Western Governors. We also provide tours to local activist organizations and various television stations and newspapers. Foreign tours include groups from the Former Soviet Union and China. As many of the Laboratory's stakeholders visit its museum, their staff has handed out hundreds of the project fact sheets, and all museum guides have been given tours of the facility

The following describes the additional actions taken for each unique stakeholder group:

UC, Employees and Subcontractors – Due to its high profile with the UC/DOE contract, this stakeholder group is very concerned about both the environmental and business success of TWISP. Special articles in LANL newsletters are also used to describe the program and how it is being managed. There are also monthly reports produced relating to key contract performance measures and other Laboratory systems (that TWISP use and operate within) such as Integrated Safety Management strengthen the communication and management of worker health and safety as well as mitigating environmental impacts. Finally, all employees working in EM/SWO and virtually all senior Laboratory managers have toured the TWISP facility to increase their understanding of the project and its challenges.

Surrounding Communities – In partnership with the DOE, LANL has engaged a formal Citizen's Advisory Board on the Laboratory's environmental impacts and activities. TWISP has been presented to this group and provides status reports to them on a regular basis. Special tours for regional interest groups (including pueblos, State legislatures, mayors, and citizen activists) are also conducted. In the case of San Ildefonso Pueblo (whose property abuts the Technical Area where TWISP operates), TWISP and EM/SWO management held meetings prior to the project startup to describe what was being done, how it would temporarily change the landscape with the construction of storage domes, and when the project would be completed. As with other stakeholder

systems, Laboratory-wide activities also support TWISP community outreach. These include formal meetings with community leaders, regular publications and WWW-based communications. Finally, telephone requests for information about TWISP are received and answered on a regular basis.

Regulators - For regulators there are few informal ways of obtaining “stakeholder input”. During the development of the TWISP program plan there were frequent interactions with the NMED. At that time it was agreed that State personnel would be regularly informed of the progress of TWISP. To that end, the weekly TWISP status report is distributed to NMED and there is frequent telephone follow-up. By having the TWISP SAR tied directly to the State compliance document (described in Section 2.2), safety concerns, process changes or unexpected delays must be immediately communicated to the State for concurrence. On the two instances where changes have been required, TWISP has enjoyed rapid (less than a week) concurrence for the necessary alteration.

## **Section 4.0 Information and Analysis**

### **Item 4.1 Business Analysis-**

TWISP has several key sources of information that support an understanding of the environmental impacts of operations. As a Federal facility working with potentially hazardous material, the primary sources are the guidelines developed that communicate expectations of both the conduct and results of the activity. Additionally, there are several systems in place at Los Alamos that communicate quantitative results in various categories

of environment, safety, and health (ES&H). These systems are tailored to report information important to both Laboratory managers and oversight agencies. These systems are described in Section 6 and many of the results in Section 7. The following table identifies some of the main requirements TWISP must follow and how TWISP uses that information in their work processes.

Costs and accomplishments of operations for TWISP are captured through a variety of systems within the Laboratory. These are applied through a project planning and control system to the baseline plan (described in Section 2) for variance reporting on either the schedule or cost estimates. On a monthly basis program reviews are conducted with the management of TWISP and senior management of EM. At that time both direct and indirect costs to all EM projects are discussed. Since the entire management team is available at that time, opportunities for collaboration are frequently identified. For example, several projects, including TWISP, share the services of the site radiation technicians. By reducing potential exposures in a coordinated fashion, the cost to all projects is reduced and the program is viewed more positively- both from an environmental excellence as well as a financial perspective.

To avoid a repetitious discussion of the key systems used by TWISP to analyze the environmental impact of operations, the reader is encouraged to examine Section 6. This section contains the detailed descriptions of the approach to managing TWISP for continuous improvement.

| <b>Requirements</b>                                  | <b>TWISP Approach</b>   |
|--|---|
| Air Pollution Control                                | Mandatory for all operations that produce air contaminates. Must have five continuous air monitors. Maintain these monitoring stations and measure airborne emissions to ensure they are monitored in accordance with requirements.   |
| National Environmental Policy Act (NEPA)             | Any project or program or change in a continuing activity that could affect the environment (air, water, and soil) cannot go beyond the planning stage till DOE approves the NEPA document. Was granted a categorical exclusion under NEPA. Must comply with NEPA by documenting the environmental impacts of all major actions affecting the quality of the human environment. Council on Environmental Quality regulations require TWISP to integrate NEPA into the planning process as early as possible to ensure that planning and decisions reflect environmental values. An example of this is the Performance Assessment Composts Analysis that examines TWISP's environmental impacts. |
| Water Pollution Control (WPC)                        | The project will channel and collect sediments from storm water run-off to ensure that radio nuclides do not migrate from the work site. They have a water collection system with a solid's separator and two 5000-gal collection tanks. They have incorporated a drain system to direct wash water to the collection system. The water from the tank is transported to the radioactive waste water treatment at TA-50.   |
| Accidental Oil, Chemical & Airborne Releases (AOCAR) | Have Laboratory requirements for handling accidental oil spills, chemical spills and atmospheric discharges in accordance with AOCAR. Minimize or element airborne emissions by HEPA filter ventilation systems, air sampling, fixatives, secondary containment, overpacking, and the use of portable HEPA-filtered units. Is used to collect aerosols,   |
| Environment Monitoring Requirements                  | Monitoring includes- air, surface water sampling, and flora sampling. The LANL air-net sampling program can detect any airborne contamination migrating from the work area.   |

|                                    |  |
|------------------------------------|--|
| Safety (hazardous chemicals) & SAR | Maintain that occupational worker and public safety are the foundation of TWISP. All operations must be performed in a manner that satisfies the DOE Orders, & the ES & H Manual. All liquids properly identified before removal. Knowledge of process and sampling will be useful in identifying hazardous waste. SAR describes how all activities being done by TWISP and postulate scenarios that could impact the project and how to best manage those scenarios. All of TWISP operational procedures come from the SAR. Changes to the SAR require an Unresolved Safety Question determination to assure that the change contains no decreases in safety. |
| Radiation Safety                   | DOE exposure limit for the public- 100 milligram per year. Laboratory limit for occupational worker- 2 milligram. The Health Physics Measurement Group supervises the personnel dosimetry program and ensures that all site personnel have an appropriate dosimetry device. They will maintain records of radiation received by workers. Workers are checked by normal monitoring, dosimetry, surveying, and PPE in accordance to ES & H Manual. Routine air will be sampled. A continuous air monitor is used on work site at all times. All workers are experienced and trained as radiation workers.  |

#### Item 4.2 Comparative Analysis-

There is very little benchmark or other external comparisons available to TWISP. Much of it is a relatively unique, one-time operation within the DOE. In 1998 a make-buy comparison was conducted to assure the DOE that the greatest value for the tax-dollar was gained. In that analysis the in-house approach was supported. Lacking external comparative data, TWISP has made much of its pollution prevention improvements by using internal comparative data. Monthly Trend data at the site have been used to drive waste volumes down. Comparative data of the costs to process a single drum are also reviewed for improvement.

In general, comparative analysis is conducted monthly and quarterly. ES &

H monitoring systems report results on this basis. These data together with cost and budget information can point out trends and opportunities for improvement. In addition to discussing them at the management meetings they are also included in special monthly Plan of the Day meetings.

TWISP also conducts less formal comparative analysis. By using clear disposal bags for rubbish, a visual inspection allows the team to identify items that are disposed more frequently than others. These items and their uses are then examined for potential changes to processes.

#### Item 4.3 Decision-Based Analysis-

Decisions are based on the results of several processes that are discussed

primarily in Section 6 of the application. In general, decisions are made on the project based on results from institutional systems and requirements from key drivers. Often times there are concurrency reviews made with DOE to ensure their concerns are adequately addresses. Because of the potential impact to the environment as well as worker health and safety, the Facility Operation Review Committee (FORC) makes final determination on the appropriateness of a decision that changes the TWISP process.

A key component to decision based analysis is the use of highly trained subject matter experts in all phases of decision making. Specifically, the management of TWISP relies on the expertise of EM/SWO Waste Coordinators and an Environmental Support Team (comprised of Radiation Control Technicians, Quality Assurance staff, and others) to conduct regular reviews of operations and make presentations to the entire team (in the Plan of the Day meeting) about potential problems and opportunities for improvement. In some cases these reviews occur as frequently as daily. Others, such as RCRA inspections occur monthly. The reader can also see that the Leadership Team described in Section 1.1 is comprised of a variety of experts. By using frequent reviews coupled with analysis/problem solving meetings, TWISP successfully leverages all its intellectual capital for decision making.

## **5.0 Employee Participation**

### **Item 5.1 Employee Education, Awareness and Skill Development-**

There is a significant investment by the Laboratory in training and professional development. In addition to a training

center devoted to ES&H related training (including hands-on practice in a variety of circumstances), there are resource centers for quality improvement, leadership, and professional development. There is also a Laboratory-wide Employee Development System used to track the training activities of employees and contracts. This system also alerts training coordinators, located in each division, when training has expired.

All major tasks in EM and TWISP have procedures that describe performance and training expectations. TWISP will not allow any workers start work on site without proper training. Training is identified in order to meet the group's performance plans and needs. This is achieved through a need analysis that includes a review of the regulatory requirements, job analysis, task analysis, the resources available, and the goals of the group. The needs analysis includes input from the workers, subject matter experts, and management. The EM/SWO Training Management Plan is the document used for training. This addresses all operations and personnel roles during TWISP operations, implements all applicable LANL requirements, and uses a graded approach with potential risks associated with each all operations. Some examples of training include emergency response, performance base, regulatory compliance & safety, and needs analysis.

Workers also review their individual training plans with their Project Leader on an annual basis. During this review, the Project Leader will make adjustments to the training plan as necessary. At this time, professional development is also discussed. Any additional training needed

for the employee to pursue career goals can then be added to the plan.

Feedback and results measuring the effectiveness of existing training are used for continuous improvements of training to make sure it is meeting the organization's key performance goals. Specifically, all training classes include survey forms, which are used by the instructor to improve his or her training. By testing competency in the subject, the effectiveness of the training in its purpose can be further evaluated. Both of these tools are used throughout the Laboratory's training program.

Training is reinforced in the Plan of the Day meetings. In fact, all meetings at Los Alamos begin with a presentation on some aspect of Integrated Safety Management. During the Plan of the Day meetings, the Project Leader discusses the tasks at hand and lessons learned from past tasks. The Project Leader encourages the employees to pick a topic and then do an assessment on that topic. Lessons learned are always a mechanism to improve the work steps. The Project Leader relies on the expertise and experience of his workers to improve work steps.

### **Item 5.2 Employee Involvement for Continuous Improvements-**

Employee involvement is the single greatest success factor pointed to by management for the environmental excellence achieved by TWISP. Most of the improvement ideas listed throughout this application have come from employees. For example, an employee came up with the idea to look at Material Safety Data Sheets (MSDS) before a liquid cleaner was used. Before, the workers would not have time to look at the MSDS and would have to dispose of

the material after use as a mixed low level or hazardous waste. After implementing the suggestion any liquid items now have the MSDS sheet reviewed before it can be used on site. This has effectively eliminated the amounts of liquid cleaners contributing to the volume of hazardous or mixed waste. Most of the ideas flow through the Plan of the Day Meetings because this is when the action plan for the day is made.

These meetings provide the opportunities for workers to express ideas and see their ideas implemented into TWISP overall goals. For example, one of the overall goals at the project is waste minimization. The worker that recommended reusing PPE as rags saw the idea implemented into the overall goals of TWISP and his or her knowledge of TWISP and EM goals was reinforced.

Employee involvement is also encouraged through an active suggestion box program and in the Management Walkarounds program; both described in Section 6. Employee recognition is key to encouraging active participation in continuous improvement. There are three ways for employees and contractors to be recognized for their ideas. They are:

- institutional awards including the Distinguished Performance Award (TWISP was a finalist for this award in 1998), two bonus award programs, and the Pollution Prevention Award program;
- personal awards within the team, including coffee mugs and certificates of appreciation given at management-hosted social events; and
- recognition-related perks offered to workers. These include a recent trip to the WIPP site for the entire team

as well as a trip to the State Capital for the Governor's Green Zia Kick-off in January of this year.

## **6.0 Process Management**

### **Item 6.1 Process Analysis-**

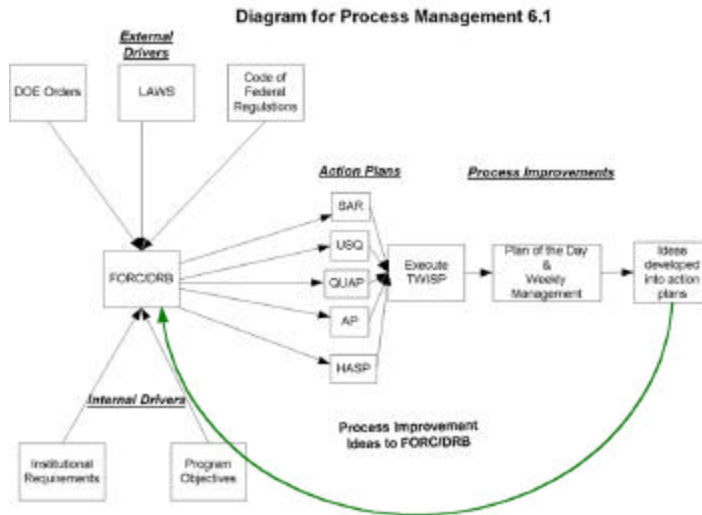
TWISP uses Configuration Management (CM) as its key process to identify environmental issues. CM is a process that inter-links all of EM/SWO activities and assures that all operations are complementary, share resources, and follow site standards. It examines all of EM/SWO functions and determines where they overlap. For instance, drums that have been cleaned and are now ready for storage are handed over from TWISP to the TRU team. Coordinating the needs and expectations of this team in conjunction with TWISP assures that newly added drums to the inventory utilizes a common labels and descriptors. It is also necessary to coordinate schedules and other resources.

Figure 6.1 illustrates how TWISP uses CM to manage its processes. On the far left of this figure are the external and internal drivers to CM. DOE Orders, Code of Federal Regulations (CFR), and laws are external drivers that establish regulations for the entire Laboratory including environment, safety, and health requirements. DOE Orders pertain only to DOE facilities, providing occupational health & safety as well as radiation requirements while CFR pertains to all

federal facilities or any facility that accepts federal funding. The internal drivers are the Institutional Requirements and the Program Objectives derived from the Laboratory and DOE's strategic plans. All of these drivers provide the requirements to execute all of EM/SWO operations.

The second box of the diagram is the Facility Operation Review Committee (FORC) and Document Review Board (DRB), which establishes TWISP's relevant action plans SAR, USQ, QAPP, AP, and HASP (these plans are explained in more detail in Section 2.2). In addition to developing plans, FORC/DRB is an internal review that makes sure any changes to the work processes do not compromise the relevant action plan's requirements. In addition, they ensure that any new ideas are implemented into the relevant action plans. One role of FORC is to assure that a common characterization approach is used for all TRU drums inventory, regardless of their origin. All of these plans are used to execute every project at EM/SWO.

A safety cycle process occurs weekly. This is a review of the regulatory compliance, technical correctness and completeness, quality, safety, and management of the TWISP project. Very often these generate ideas which are further explored.



### Item 6.2 Process Improvements

The second part of the diagram displays the tools TWISP uses to improve its processes and how it feeds back into process analysis. TWISP primarily uses the Plan of the Day and Weekly Management meetings to improve its processes. During the Plan of the Day meeting, we conduct an overview on health, safety, and environment status for site workers. The Project Leader assigns the tasks for the day to the workers and sees if any new concerns or improvement ideas pertaining to the tasks identified. The workers discuss new concerns or improvement ideas and the Project Leader will have the health and safety officer assesses the environmental, health and safety risks associated with it.

There is a similar process for the weekly management meeting. DOE attends this meeting to hear first hand about the progress and issues facing the project. This provides DOE with an opportunity to express any concerns or improvement ideas that they may have about operations. In addition, it gives an opportunity to brief DOE about adjustments, successes and improvements to operations.

At each of these meetings, concerns are developed into a corrective action statement. From the statement, improvement ideas are proposed and developed into action plans. Before any new procedure is reviewed by FORC, TWISP prepares a USQ to determine if there are any safety concerns or issues that could compromise either the project or the facility. These action plans and USQ are reviewed by FORC. If the proposed plan does not conflict with any existing plans or requirements, then the process improvement is integrated into TWISP operations. In addition, FORC will also update relevant plans to include the new improvements.

An implemented improvement idea from Plan of the Day includes, removing secondary waste from a radiological controlled area. Originally, TWISP would unwrap the shipments inside TA-54 and dispose of the packaging material as LLW because it was suspected to contain radiological material. Now, TWISP unwraps the shipments outside the Radiation Controlled area so that the packaging material will not be disposed of as LLW. The packaging material is now thrown into a Green is Clean



dumpster so that it can be reused or disposed of as sanitary waste at the county landfill.

Several tools are used at TWISP on an as-needed basis to fully realize process improvement opportunities. These include flow charts (information flow), process maps, technology roadmaps, and brainstorming. The Green Zia tools have recently been used in the latest evaluation of the drum washing process. Using a team of TWISP workers, waste streams were identified through process mapping, costs were attached to the waste and a pareto analysis done to identify the most costly waste stream.

### **Item 6.3 Managing Processes to Achieve Environmental Excellence**

As stated throughout this application, LANL environmental excellence goals are zero waste, zero environmental incidents, and zero health and safety incidents. TWISP achieves these goals by the Plan of the Day, Weekly Management Meetings, Quarterly Reporting (performance objectives, and six zero's), daily safety assessments, FORC, Management Walk Arouns and RCRA inspections. As the diagram illustrates, each of these processes engage management and staff at specific levels of the laboratory. For example, the Plan of the Day tasks specifically impacts TWISP. The 5003.B Occurrence Reporting process is a DOE-wide program where significant ES&H and security incidents are reported to the highest levels and formal lessons learned program generated. It requires rapid notification of management and tracks & trends such incidents for the benefit of the Complex.

These processes manage our day to day operations to ensure that we meet our

environmental excellence goals.

Management conducts twice monthly Management Walk Arouns. These help assure environmental excellence in three ways: (1) getting management to the work site to gain a first-hand understanding of the work and related hazards; (2) fostering communication about environment, safety and health concerns within a comfortable environment for the worker; and (3) identifying corrective actions or best businesses practices that could be used within the work processes.

Training is another management process TWISP uses to achieve goals for environmental and project excellence. With such extensive training (described in Section 5), workers become very knowledgeable about more than just their tasks at hand. By learning about regulations and gaining an understanding of our vision for environmental excellence, they can actively contribute to process re-engineering as partners in managing for excellence.

|                      |   |   |   |   |
|----------------------|---|---|---|---|
| Audit & Assessments  | x | x | x | x |
| Occurrence Reporting | x | x | x | x |
| Quarterly Reporting  | x | x | x | x |
| Walk Arouns          |   | x | x | x |
| FORC                 |   |   | x | x |
| RCRA Self Reporting  |   |   | x | x |
| Weekly Mgmt          |   |   |   |   |
| Plan of the Day      |   |   |   | x |

Figure 6.3

## 7.0 Results

The TWISP team is very proud of the results they have achieved in the past two years and the teamwork that is largely responsible for that success. One thing TWISP has not attempted to do is to rigorously quantify the numbers of suggestions generated and acted upon by the project. Anecdotally it is known that the drum washing process has been re-engineered four times to minimize waste and cost and that three of the four improvements were suggested by workers. TWISP refers to zero health and safety incidents, significant cost savings, dramatically reduced waste volumes, several pollution prevention awards and staff excellence to identify employee satisfaction and project effectiveness.

### 7.1 Environmental Management Results-

| Month | Findings<br># |
|-------|---------------|
| 01/98 | 9             |
| 02/98 | 15            |
| 01/99 | 8             |
| 02/99 | 2             |
| 03/99 | 1             |

Over the past two years, a dozen walkarounds have been conducted at the TWISP project site. These have resulted in the identification of five observations and two notable practices.

TWISP's internal RCRA daily and weekly inspections identified approximately 8 occurrences for improvement (Actions Required AR's) including drums having rust and pinpoint holes that requires (2) over packing, (4)

The Laboratory tracks and reports OSHA-type data for DOE that reflect the safety of the work environment. One such metric is Total Reportable Incidents (a formal OSHA-equivalent figure calculated based on the total number of manhours vs. lost hours due to injury or illness). The Laboratory average of Total Reportable Incidents has ranged from 5.5 (January 1998) to its current level of 3.35. These figures can be interpreted to mean that for every 100,000 hours worked there are (currently) 3.35 incidents resulting in injury or illness. TWISP has never had an incident resulting in injury or illness in the over 44,400 hours worked on the project nor has lost any productive hours from injury or illness.

Daily safety inspection findings are recorded for the TWISP project. The following indicates the downward trend of findings for TWISP from this report by contrasting the results of the first months of the projects two years.

lighting or power outages, and (2) alarm & communication outages. The Action Required AR's were all corrected within a week.

The only 5003.b occurrence is the self identified safety occurrence, which was the reason for modifying the retrieval operation.

### 7.2 Customer, Market and Stakeholder-Related Results

In FY98 and FY99 (year to date), the TWISP project has received scores from its evaluations by both UC and DOE on the basis of specific performance objects that indicate it is *Meeting* or slightly *Exceeding* expectations. If additional funds were made available to TWISP so

that they could continue an accelerated pace, it is projected they would receive a full “Exceeds” performance score for FY99.

Each year for the past three years, TWISP has given papers and presentations at the annual Waste Management conference in Tucson, Arizona. It has also made design improvements to equipment that will be used across the market (other DOE facilities), thus strengthening LANL’s position as the Lead Laboratory in TRU waste management. Specifically, the drum vent was redesigned from previous specifications to include a characterization port. By streamlining drum characterization, sites such as INEEL will save over \$45 per drum per year in costs (for INEEL this will equal **\$1.3 Million dollars annually**) in material costs alone.

TWISP measures stakeholder results using two data points: number of tours and number of information packages distributed. As of March 30, 1999 there have been 62 tours conducted of the TWISP operation. Over 1200 “fact sheets” have been distributed at the museum and at technical conferences. Interviews have been conducted with two television stations and there have been presentations to local three Rotary and Kiwanis Club meetings.

### **7.3 Financial Results:**

TWISP has managed to reduce the planned expenditures by over 10% from its original budget. \$6,043,000 is the current estimated savings over the life of the project.

### **7.4 Environmentally-Related Results**

A compliant safe and healthful workplace is a critical for both the Laboratory and at TWISP. To help achieve this there is a significant investment made in training staff. Every year each person on the TWISP project receives over 100 hours (110 is average) of Laboratory and Site-specific training and up to 60 hours of procedure and project training for TWISP. Training results over time indicate that the number of hours for training have increased 20% over the past two years. This reflects continuing concern that employees understand the environment and health risks as well as mitigation strategies associated with their activities. The average number of hours of environment, safety, and health training for staff at LANL is 10 hours.

In terms of RCRA findings, fines, Notices of Violation or Deficiency that reflect results based on compliance expectations, TWISP has never been cited for such a violation either from external inspection or internal self-assessment.

TWISP has significantly reduced its generation of waste since the project began. The following table summarizes TWISP waste generation levels.

| Waste Volumes |                    |                    |                    |
|---------------|--------------------|--------------------|--------------------|
| Waste Type    | FY97               | FY98               | FY99 *             |
| TRU           | 0.0 m <sup>3</sup> | 0.0 m <sup>3</sup> | 0.0 m <sup>3</sup> |

|                 |                    |                       |                    |
|-----------------|--------------------|-----------------------|--------------------|
| Low Level       | 37 m <sup>3</sup>  | 3.7 m <sup>3</sup>    | 2.0 m <sup>3</sup> |
| Mixed Low Level | 0.0 m <sup>3</sup> | 6.1 m <sup>3</sup> ** | 0.0 m <sup>3</sup> |

\*\*Projected based on 9 months data \*\*Accidental container release and cleanup materials

In addition to these reductions in waste volumes, 33.3 m<sup>3</sup> of Low Level Waste has been avoided in FY1999 (year-to-date) through the following programs:

- 16.6 m<sup>3</sup> avoided through removal from the Radiation Control Area after Green is Clean characterization
- 4.5 m<sup>3</sup> avoided and recycled through cardboard recycling program
- 12.2 m<sup>3</sup> solid waste disposed as sanitary (vs. Low Level) through material packaging screening program.

### Acronyms

|           |  |
|-----------|--|
| AP:       | Administrative Procedures                                |
| CFR:      | Code of Federal Regulations                              |
| CM:       | Configuration Management                                 |
| CMP:      | Configuration management plans                           |
| DOE/LAAO: | Los Alamos Area Office of Department of Energy           |
| DOE:      | Department of Energy                                     |
| DRB:      | Document Review Board                                    |
| EM/SSWO:  | Environmental Management Division Solid Waste Operations |
| EM:       | Environmental Management Program                         |
| EPA:      | Environmental Protection Agency                          |
| ES&H:     | Environmental, Safety, and Health                        |
| FORC:     | Facility Operation Review Committee                      |
| HASP:     | Health and Safety Plan                                   |
| LANL:     | Los Alamos National Laboratory                           |
| MSDS:     | Material Safety Data Sheets                              |
| NMED:     | New Mexico Environment Department                        |
| PA:       | Performance Assessment                                   |
| QAPP:     | Quality Assurance Project Plans                          |
| SAR:      | Site Safety Analysis Report                              |
| TRU:      | Transuranic  |
| TWISP:    | Transuranic Waste Inspectible Storage Project            |
| UC:       | University of California                                 |
| USQ:      | Unanswered Safety Questions                              |
| WIPP:     | Waste Isolation Pilot Plant                              |
| WM:       | Waste Management   |

